April 2007

An Inventory of Inquiry-Rich Courses at Texas A&M: A First Look

Purpose of the Inventory

The QEP Council and the University community believe that increasing awareness and opportunities for inquiry/research based education will enhance student learning and better achieve the University's educational mission. The inventory is an online survey designed to identify the current status of inquiry/research-based education at the University.

Introduction and Background

The inventory identifies inquiry-rich components of existing coursework and activity will mark the starting point for future development of inquiry/research-based education of undergraduates. This report discusses the information from all inventory submissions to understand more about the current state of inquiry/research-based education of undergraduates at Texas A&M. The University's effort to improve undergraduate education emerges from the 1997 document, *One Principle: Twelve Ideas*[1] and then successively through *Vision 2020*[2] (1999), the 2001 *Quality Enhancement Planning Committee Report*[3], the 2002 document *In Pursuit of the Vision*[4], the *Enhancing the Undergraduate Experience Task Force Report*[5] of 2005, and the 2006 *Murano Report*[6] refined Quality Enhancement Plan (QEP) of Inquiry/Research-based Education of Undergraduates.

Through this inventory process, the University hopes to further clarify the definition of student learning in the context of inquiry/research-based education. In addition, the University hopes to discover the following:

- What activities tend to be used most effectively in inquiry/research-based education at Texas A&M University?

- What skills or competencies receive the most focus for undergraduates at Texas A&M University in the context of Inquiry/Research-based Education?

For those interested in the methods used, please see p. 25 at the end of the report.

Trends and Tendencies—First Results

Table 1

Question 1-- 80.2% of inventory respondents agree that "intellectual inquiry and research represent important components of a well-rounded undergraduate education."

Question 2-- presence of intellectual inquiry and research in undergraduate education,

- 59.6% stated that Texas A&M has "somewhat too little," and
- 18.0% believed there is "far too little"

Q.1 Would you agree or disagree with the statement; Intellectual inquiry and research represent important components of a well-rounded undergraduate education?''

Choice	Count	Percentage of Sample Answering	Percentage of Sample Asked	Percentage of Total Sample
Strongly Agree	260	**80.2**%	76.9%	67.2%
Somewhat Agree	55	17.0%	16.3%	14.2%
Neither Agree nor Disagree	6	1.9%	1.8%	1.6%
Somewhat Disagree	0	0.0%	0.0%	0.0%
Strongly Disagree	3	0.9%	0.9%	0.8%

Table 1 (April Update)

Q. 2. Which of these statements would you most agree with?

Choice	Count	Percentage of Sample Answering	Percentage of Sample Asked	Percentage of Total Sample
Undergraduate education at Texas A&M has far too much intellectual inquiry and research.	1	0.3%	0.3%	0.3%
Undergraduate education at Texas A&M has somewhat too much intellectual inquiry and research.	2	0.6%	0.6%	0.5%
Undergraduate education at Texas A&M has the right amount of intellectual inquiry and research.	69	21.4%	20.4%	17.8%
Undergraduate education at Texas A&M has somewhat too little intellectual inquiry and research.	192	**59.6**%	56.8%	49.6%
Undergraduate education at Texas A&M has far too little intellectual inquiry and research.	58	**18.0**%	17.2%	15.0%

Table 2 (April Update)

Table 3

72% of the participants from both campuses responded to one or more of the queries in Part II of the Inventory.

Table 4

Competencies **(2)** and **(3)** are by far the most widely distributed Inquiry Guided Learning competencies, through a range of 74.2% to 86.2% between the two campuses. Competencies **(1)** and **(4)** -- these competencies are functionally present and supported in their courses.

The **(1st)** compete--more difficult to assess at the lower division undergraduate education because, as one respondent noted, "The foundation for research has not been sufficiently laid."

Table 5

Upper division representation comprises 83.2% and 86.1%, respectively, for the TAMU and TAMUG campuses. The **(5th)** competency received the lowest tally count and was the least represented competency. In terms of tally count, both campuses posted comparable numbers.

Participation Rate in Part II of the Inventory

College	Total # of Record IDs	# of Record IDs Associated with Part II Participation	Percentage of Record IDs Associated with Part II Participation
AG	37	33	89.1
ARCH	33	0	0.0
BUS	75	51	68.0
ENGR	28	24	86.7
GEOSCI	20	15	75.0
LA	53	40	75.5
SCI	52	48	92.3
STUAF	10	10	100
VETMED	7	6	85.7
TAMU	315	**227**	72.1
TAMUG	40	**29**	72.5

Table 3 (March Update)

Competencies Distribution

Competency	**TAMU**	**TAMUG**

	From Population of N=227 Competency Tally **/ % of N** */ % Total Tally (accumulative)*	From Population of N=29 Competency Tally **/ % of N** */ % Total Tally(accumulative)*
(1) Formulate good questions and/or identify problems(s) within the discipline	106 / **46.7** / *17.2*	15 / **51.7** / *17.6*
(2) Examine, identify, and gather information regarding the questions(s) and/or problems	174 / **76.7** / *28.2*	24 / **82.8** / *28.2*
(3) Analyze, interpret, and present results	169 / **74.4** / *27.4*	25 / **86.2** / *29.4*
(4) Formulate conclusions(s) and/or select the best solution with appropriate justification	115 / **50.7** / *18.7*	14 / **48.3** / *16.5*
(5) Evaluate the worth and importance of those conclusion(s) – including their placement in a social, environmental and historical context, as appropriate	52 / **22.9** / *8.4*	7 / **24.1** / *8.2*
Total	616	85

Table 4 (March Update)

Part II Lower and Upper Level Undergraduate Representation

Campus or College	Part II Lower Level Undergraduate Representation Expressed as # and **Percent**	Part II Upper Level Undergraduate Representation Expressed as # and **Percent**
TAMU	38 **16.7**	189 **83.3**
AG	2 **6.1**	31 **93.9**
BUS	3 **8.3**	48 **94.1**
ENGR	2 **8.3**	22 **91.7**
GeoSci	1 **6.7**	14 **93.3**
LA	4 **10.0**	36 **90.0**
SCI	23 **47.9**	25 **52.1**
StuAF	3 **30.0**	7 **70.0**
VetMed	0 **0.0**	6 **100.0**
TAMUG	4 **13.8**	25 **86.2**

Table 5 (March Update)

Table 6

- A byproduct of the spreadsheet on "Good Practices." Highlights those entries labeled as **Exceptional** and list or practices, strategies, and activities that contain context driven or context specific descriptors.
- Absence of checkmarks on the College Summary Spreadsheets --insufficient information for evaluation.

Note: Lower division courses are significantly underrepresented in Part II of the Inventory, but they are overrepresented in the spreadsheet of "Good Practices." Table 6 represents a reconfiguration of the "Good Practices" spreadsheet, where the cells under the "Teaching Engagement Strategy" and "Indicators of Student Success" columns are mined for skills and activities. Implication—difficulty of separating a skill from an activity, particularly in a survey that does not partition the data in this manner.

Skills and Activities, Table 6

Legend TAMU – Texas A&M University, College Station TAMUG – Texas A&M University, Galveston AG – Agriculture BUS - Business ENGR - Engineering GEOSCI – Geosciences LA – Liberal Arts MARS – Maritime Science SCI – Science LD – Lower Division, 100-200 Level courses UD – Upper Division, 300-400 Level courses		
Campus/College/Level	**Skills (Competencies)**	**Activities**
TAMU/AG / LD	Students assemble corresponding skills in order to formulate a problem-solving process. Students then go through the process, quite often by learning from anticipated errors, to build up solutions toward problem-solving. Students must integrate normalized contributing factors into a unified overall index and show graphically and spatially the contribution from each factor and the summation result from all factors that explain the problem-solving process. Deploy a master methodology to ensure that each contributing factor will have to be properly formatted and incorporated to effectuate accumulative "evidences." Along the way, "paper trails" will be established to justify the outcomes.	Students summarize problem-solving processes and resolutions, graphically, spatially and artistically, in such packages as PowerPoint and present the document professionally to the rest of the class. The paper trail itself, along with the final summation of results, is also explicitly examinable - in the form of maps, images, tables, graphs and other formats. All data from this course are derived from the real world, e.g. Census Data, local data from the City of College Station. All learning modules and the required final projects are about solving real world problems, e.g. assessment of damages from Hurricane Katrina and evaluation of Quality of Life of specific locales in the City of College Station. Because of the real

		world context, students are able to relate more closely to the class stipulations.
TAMU/AG / LD	Students develop appropriate research questions, contrast methods, and determine soundness of results. Students search for information, filter facts, and extract appropriate correlations to their own results. Students formulate research hypothesis for lab reports and for the class project	Students examine satellite imagery and identify a suit of processing needs to answer questions. Students examine and interpret Remote Sensing Images to process tasks and solve problems with environmental and societal context, e.g., urban growth, deforestation, etc. Students often correlates findings with other reports, e.g., census data
TAMU/AG / UD	Students must be able to critically analyze a research article in writing (and perhaps also aloud), state the purpose, key questions posed, information provided, the conclusions, assumptions, implications that logically follow and the point of view taken. Students answer the following questions: Is the question at issue clear and unbiased? Does the expression of the question do justice to the complexity of the matter at issue? Is the writer's purpose clear? Does the writer cite relevant evidence, experiences, or other information essential to the issue? Does the writer clarify key concepts when necessary? Does the writer show a sensitivity to what they	The research article analyses are validated through written homework, in class discussion and evaluation of homework and lab exercises, analysis of written papers, essays, and reports of their own laboratory exercise results. The students' writings and reflections are assessed through written homework and in-class assignments, small group discussions, laboratory simulation model results, and essay exam questions.

	are assuming or taking for granted (insofar as those assumptions might reasonably be questioned)? Does the writer develop a definite line of reasoning, explaining well how they arrive at their conclusions? The students must also be able to critically analyze their own and each other's work by answering the following: Do I/they develop a definite line of reasoning, explaining well how they arrive at their conclusions? Do I/they show sensitivity to alternative points of view or lines of reasoning? Do I/they consider and respond to objections framed from other points of view? Do I/they show sensitivity to the implications and consequences of the position they have taken?	
TAMU/BUS / LD	This course is project centered around the Stanley Marcus Retailing Communications Competition. Basically, students are divided into groups. Each group chooses a local retailer and conducts a retail audit on this company. The retail audit includes: an analysis of the company's strengths, weaknesses, opportunities and threats; an analysis of the competition - both current and forecasted (including perceptions, competitive strategies and practices, sales, etc.); and an analysis of the retailer's current positioning strategies.	The groups design, collect, and analyze data on consumer perceptions and current retail practices. Data is collected using a variety of methods, including focus groups, personal interviews, mystery shopping activities, and surveys. They analyze their collected data and ultimately come up with a number of implementable, realistic recommendations for the retailer. They have to come up with suggestions that the retailer could and would actually implement. Their recommendations must fit within the social environment of the retailer and its customers, fit within the

		current resources and legal practices of the environment, and match the positioning of the retailer (historical context). Students are encouraged to come up with a few, quality recommendations, not a long list of bulleted ideas for improvement. In fact. The students have to forecast the costs and benefits of each of their recommendations. Students compile this work and present it in both written and oral formats.
TAMU/GEOSCI / LD	In lab and lecture, students are asked to consider complex forecasting processes and tasks and to discuss problems and issues. The goal is for the class to identify hidden issues and problems, to discuss root causes of complexity, and on occasion suggest novel approaches to solving them. Students learn to identify key points of failure in a forecast process and to formulate questions and problems based on those points. We often evaluate various forecasting techniques in lab using real-time and archived case studies, discuss forecasting successes and failures, and make suggestions regarding improvements. This requires students to gather, organize, and analyze data. Forecasting meso-scale severe weather requires the analysis of a variety of observational and	Student groups are asked to conduct real time forecasts of severe weather using weather data available on the internet and with custom data/software. The students must write a weather discussion that justifies their forecast based on the analysis and interpretation of the data that they have gathered. The student groups must write a discussion each week explaining and justifying their severe weather forecast. Once or twice per semester, each group must present their forecast solution and justification orally to the entire class using computer graphics (i.e., weather discussion). As part of the weather discussion and forecasting exercise, the foresting groups discuss the damage and causalities caused by severe

	model output data. Students must analyze and interpret these data based on forecasting techniques grounded in physics that are presented in lab and lecture. From complex and varied data sources, students must analyze the data using a variety of complex forecast techniques, and then make a forecast of a specific severe weather event over some region.	weather from the prior day or forecasting event. Student groups discuss successes and failures and their potential impact on society.
TAMU/SCI / LD	Students engage in reading and understanding an academic paper and then relate this information to the publicly available dataset which the author is talking about. That sounds easy, but it can be quite difficult even with a well written paper. Each student should be able to recreate the results of the researcher, but that is rarely the case for a variety of reasons. So once we have looked at what the researchers did, we look at better ways to use the data to answer the question more rigorously. Students need to learn to develop their own model and interpret the results. By interpret I mean be able to produce graphs which visualize the results and show what they mean.	Students have 3 projects - first 2 smaller projects so they can get the hang of it, but the hope is for the third they can be more independent. Students do verbal presentations so they have the opportunity to explain in words the way they approached the problem, built a model, and interpreted the results
TAMU/LA / LD	Students evaluate a series of ancient archaeological "monuments" in terms of various theoretical models current in the field. Students conduct fundamental research on well-known	Each student would be assigned one ancient site (Pompeii, Masada, Athens) or one ancient monument (the Venus de Milo, the Parthenon, the Mausoleum at Halicarnassus) and asked to

	ancient monuments their cultural context(s), finding parallels, and gaining the tools to work with various Greek and Latin historical documents, all of which are widely available in translation. Students become familiar with standard reference works and research tools and make well-organized student presentations with well-written synopses. Students will have the opportunity to consider, in-depth, some of the great icons of the Classical Greek and Roman world, and evaluate them from a variety of perspectives. Students should acquire a sense of the extent to which theoretical filters have influenced whole genres or schools of archaeological research.	interpret it in terms of a number of archaeological philosophies (New Archaeology, Annaliste school, feminist archaeology, etc.) Students share their work with fellow classmates, through oral presentations and communal evaluation of their research findings. Reading assignments and group discussions add to their understanding.
TAMU/LA / UD	Students derive successful formulation of a thesis combining existing model with an assessment of their strengths and weaknesses when interpreting early modern materials resulting in a convincing essay, which uses new applications of primary materials to support its thesis. To write the long seminar essay successfully, the students first create a proposal outlining the issues, questions, and sources that they will be working with; this document is the starting point of the extended analysis of the identified areas of question. The students first create a proposal outlining the issues,	Students compile a collection of primary and secondary texts which may be used to interrogate the model and to propose an alternative interpretation. The successful seminar paper is given in class as a presentation, critiqued by the seminar participants, and exists as a substantial essay suitable for use as a writing sample for graduate school applications, etc.

	questions, and sources that they will be working with; this document is the starting point of the extended analysis of the identified areas of question. A successful seminar paper not only looks at recovering knowledge about the past, but also about how we view the past through its literature and texts and the ways in which these understandings of past cultures affect the perception of present day issues.	
TAMU/LA / UD	Students develop hypotheses that build on past research. The following skills are emphasized in the course: articulation of interesting hypotheses, Identification of appropriate operational measures of concepts, collection of valid and reliable data, using data correctly in bivariate and multivariate regression models, articulating criteria for rejecting hypotheses, applying criteria correctly and correctly interpreting the results of data analyses.	Students demonstrate correct use of bivariate and multivariate regression analysis and correct interpretation of results, and draw correct conclusions based on interpretation of direction and strength of measures of association. Students collect data from the states to test their hypotheses. Students use quantitative analysis to test their hypotheses.
TAMU/LA / UD	Students devise a testable hypothesis about how electoral institutions affect some aspect of political behavior. Students must write a paper that presents a hypothesis, grounds it in the literature, collects appropriate data to test the hypothesis and discusses the findings. Students situate their hypothesis in the literature, and utilize the existing literature to explain why they decided to test their	Students must turn in a paper proposal that includes their hypothesis for their paper. Next they research the paper, gathering literature on topics related to the hypothesis, gather data to test the hypothesis, and present their results. For the team paper, students make use of literature (much of which is theoretical) to apply to the specific conditions of the country for

	hypothesis in the way they did. Students base an argument in scientific literature, rather than simply on personal experience -- to use the scholarly literature as a basis for (1) developing a hypothesis, applying a hypothesis to new cases, modifying an hypothesis; and (2) assessing the likely impact (both positive and negative) of a political institution in a particular type of context. The individual paper involves consideration of how time and place (different types of countries, different time periods) are likely to affect the generalizability of a theory in the literature, or of their hypothesis. Students consider the importance of temporal context, or country context for their hypothesis. The team paper involves consideration of how the institutions they propose are likely to function given the specific social, environmental and historical context of the country for which they are designing the institution (consideration of the generalizability of scholarly literature about institutions to different types of countries). In the team paper in which they design a constitution for a country, part of the purpose of this project is to get students to assess how specific types of political institutions (e.g., electoral laws) are likely to operate in different types of social and historical contexts.	which they are designing a constitution.

TAMU/ENGR / LD	Students design an artifact to address a societal need, predicting its behavior using math and physics and then demonstrate how this prediction is indeed borne out. Students discover how to predict the performance of their device through a series of questions that address a variety of needs. The students have to devise methods to find the breaking strength and other material properties of the elements that they use to design their artifact. The students have to build an artifact that satisfies the stated need. The students have to arrive at four possible designs and explain how their design satisfies the needs and constraints. They are then asked to combine these solutions and arrive at the best solution.	Students carry out these experiments (in the physics lab for the clustered sections) and arrive at the measure of these material properties that are then use for their performance prediction. Students compare their performance predictions with the actual performance of their artifact. If the two do not match (within a preset bound) they are asked to re-examine their testing procedure as well as their calculations. The first trial is called a project dry run allows the students to recover from errors in design and/or calculations. They have to then come back next class and redo the demo and show that their design is successful. Students present their interim findings in a series of structured technical memos. Each student in a team is responsible for producing one such memo. Students build a model of a pedestrian bridge across Bizzell Street and associate this with the university master plan. The second project is to build a model wheel chair lift for a car using a Lego Mindstorms system complete with speed restrictions and safety assessment. Finally, in ENGR 112, the students are asked to build and guarantee the performance of a vibration isolation system for a building. This is connected up with a discussion of disaster prone areas of the world and historical effects of such

		catastrophes.
TAMU/ENGR / LD	Analyze and interpret customer requirements for a flight vehicle, size a flight vehicle to satisfy performance constraints, and determine suitable configurations for a specified mission Understand the system relationships and interactions between aerodynamics, structures and materials, dynamics and control, propulsion, performance, and internal systems on the design of a flight vehicle Recognize the role of civil and military regulations and the importance of considering safety, reliability, and maintenance considerations in flight vehicle design. Students must demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	Students work successfully as a member of a team, conduct and document a detailed and complete preliminary design of a flight vehicle. Students develop technical reports, Preliminary Design Review presentations, Critical Design Review presentation, and cooperate in a team evaluation.
TAMU/ENGR / UD	Outcome Definition: Students are able to recognize opportunities for applying industrial engineering tools to improve operational aspects of complex production, distribution, and service systems. They can define and formulate the important elements of an industrial engineering problem in a	Students must craft a well documented project proposal, design review, website, final report and presentation.

	concrete, quantitative language of engineering and mathematics. Furthermore, students are able to apply engineering, statistical, and mathematical methods to analyze the problem formulations and develop appropriate solutions that improve the operation of the system. Course Experience: A large component of the design project is understanding the critical issues about the problem, extract the relevant problem, and determining how to setup and solve this problem. Often, the industry contact describes the problem from their own business perspectives and jargons. The group has to identify the underlying problem, formulate the problem, and develop strategies to solve the problem. Students are able to conduct a statistical study of a given situation. They should be able to define the problem, determine the constraints, design the experiment, collect data, perform required analysis and interpret the results. They should be able to apply the fundamental principles of experimental design: replication, randomization and local control – each principle playing an important role in the development of a significance test. Students should be able to determine variation caused by random variation and a systemic effect.	

	Course Experience: The students have to identify the data requirements and methods for data gathering. They have to perform analysis of the measured data for accuracy and relevance, and determine how to use the data and develop strategies while dealing with missing data. Depending on the project requirements, they have to design and conduct experiments and perform sensitivity analysis to test their solutions. Outcome Definition: Students are able to integrate different types of knowledge and skills to design a system or a process consisting of multiple components working together as a whole. Students have an appreciation for the design process including the blend of analysis and creativity, the requirement for satisfying multiple, perhaps conflicting objectives, the trait of lacking a single correct answer, and the need for an iterative type approach. Course Experience: The steps of the scientific method can be reformulated as follows when we consider specifically the engineering design process: (1) define the problem; (2) analyze the problem; (3) generate alternative designs; (4) evaluate the alternatives; (5) select the preferred design; and (6) implement the design. The six steps of the engineering	

	design process recast into the following process for conducting the capstone design project: • Define the objective of the project • Specify primary and support activities to be performed • Determine the interaction between activities • Determine requirements for all activities • Generate alternative strategies • Evaluate strategies • Select a strategy • Implement the strategy • Maintain and adapt the strategy • Redefine the objective. This takes place according to a life cycle consisting of three phases: (1) objectives; (2) plan; (3) implementation.	
TAMU/ENGR / LD	1. Students work in teams and begin with open-ended statement by outside sponsor, 2. Analyze need, 3. Functionally decompose problem, 4. Determine conceptual design that satisfies functions, 5. Select for refinement best design that meets criteria 1. Students design complex systems, 2. Students design special-purpose parts and assemblies to support to support systems, 3. Students present conceptual data, 4. Students present final design. Each design team designs several concepts, and learns methodology to select best solution.	Students complete and communicate by report and formal presentation, design that fulfills the intended purpose within constraints of time, cost, and selected physical parameters. Students submit reports (including drawings) Students make important final design presentation to outside design sponsors. Students complete and communicate by report and formal presentation design that fulfills the intended purpose without deleterious impacts on economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability aspects.

	Students arrive at a number of suitable concepts and are able to winnow out less suitable solutions to arrive at best one. Students are able to present acceptable solution to instructors and outside design sponsors.	
TAMUG/LA / LD	Students examine family/cultural/media influences over racial and gender self-definition as they examine identity, values, and goals in their lives. By examining the efforts of others, they begin to get some perspective on themselves. Finally, by creating a portfolio of their conclusions in writing, they gain some insight into the limitations of their own experiences. Each assignment must speak to a defined audience, from letter to Investigative report, they must speak to a broader audience. Rubrics modeling each task are provided and taught	Students compose and submit essays for each topic that provide them with an opportunity to articulate their understandings. A final research paper, which takes the form of an Investigative Report, gives them opportunities for both primary and secondary research. Each written assignment requires feedback, using the rubric as the model, from partner, team, and teacher. Assessment forms, using the rubric as a guideline, are provided for those who provide feedback to the writer.
TAMUG/MARS / LD	Students identify important marine geology topics being covered in the news, and to learn about the expertise/specialty of famous marine geologists (i.e. some are volcanologists, some sedimentologists, some paleo-oceanographers, etc).	Students are asked to identify a newspaper article published in the last 2 weeks (using Lexis-Nexis) about some aspect of Marine Geology (the MARS430 course). This can be an article about volcanoes, earthquakes, sea-level rise, beach erosion, etc. The student is then asked to "role play" that they are a famous marine geologist of the past (discussed in the text book) and to write a one page letter-to-the-editor to comment on the newspaper article. Five

		students in each team then have to role play that they are the editorial board of a major newspaper charged with choosing the one letter-to-the-editor that will be published. They have to argue about each of the five newspaper articles (i.e. which is more important) and about the five marine geologists (i.e. which is most qualified to comment of the topic chosen. Example activity: Each student is given a bag of various colored/shaped beads. They are also given a list of "species names" in Latin that represent each colored or shaped bead. Each "species" also has its temperature tolerance range given. They are asked to calculate the ocean temperature at the time the species found in their sample was deposited on the seafloor (this is known as a transfer function. The student first has to sort the beads, then identify the name of each shaped/colored bead by the Latin names, but there are more "species" than found in any one bag (sample). They have to work with their tem members (who have other samples) to identify all species. Once the species have been identified and counted, they then have to calculate the transfer function temperature. Then they have to assemble all of the samples into a core sequence and then interpret what part of the

		world ocean the core (made up of the samples) was collected. Finally, they then have to compare this transfer function temperature with an isotopic temperature. The students also have to calculate the isotopic temperature from "raw" data that needs to be analyzed. Example activity: Students are given a few basic facts (i.e. how many cubic km's of the Greenland Ice Sheet melts per year, how much the ocean has warmed in the last 50 yrs, what is the sea level rise curve for Galveston Island. The students then need to calculate how much sea level rise is due to melting ice, how much is due to thermal expansion, and how much is due to isostatic sea level rise/fall. A conclusion as to the relative importance of each factor is drawn, and then a prediction as to what Galveston Island will look like in the next 50yrs is made, with recommendations as to housing construction on the west end of the island.
TAMUG/LA / LD	Students must research not just the timbers and fastenings that go into building a vessel, but they must understand the cultural context of the ship, and to do so they must ask and answer a number of questions. For example, what is the time period? What is the level of technology and education of shipwrights at this time? What resources and tools are	I play the ship owner who is contracting to have a ship built. I always include minor errors in the contract in regard to size, tonnage or even the type of ship I request may not be practical. Most of the middle to upper level students are able to see the errors and propose corrections in the contract. Occasionally, I get a student who sees things that I

	available? What is the prevailing economic system: slavery, extended family, or centralized government support. By asking and answering these and other questions, students are able to have a better understanding of the choices shipwrights made and why they made them when building ships. Each student must break their research project down into specific and detailed steps beginning with accepting the contract to delivery of a ship. Any glaring omission of a step or steps, indicate a lack of success. A student can't begin by just listing the different types of timber and metal fasteners that go into building a ship. They must explain why pine and not oak is used. How does the shipwright choose not just the type of wood but what pieces from a tree make the best frames or hanging knees and why. As a master shipwright do they live near the forest and walk out and choose their timber from live stands of trees as in ancient Greece. Or do they live in societies like ancient Rome or 19th century America where the forests are too far away and master shipwrights must choose and buy timber floated down rivers from distant forests. What effect do these social conditions have on the process. It is usually easy to see if a student has missed a step and a	have missed or accepted as fact throughout my career or sees a new method or pattern in the construction of their ship. Even if these are not viable upon further study, the fact that they have made such a step is a success in itself. The student is able to describe the construction of a vessel that will perform requested tasks within a specific cultural context. For example, I requested that a student build me a ship to carry 600 amphorae within the cultural context of 550 B.C. Greece. The student analyzed the requirements the cargo placed on the hull and took into account long term costs, such as repairs. The student then proposed that instead of building the standard laced construction that I should instead contract for the more expensive but newer method of pegged mortise-and-tenon construction. He then went on to explain how he would customize the standard form of construction to my needs. I was able to judge his success by how well he adapted the prevailing technology to my needs within the specific cultural context and if what he was proposing was a practical solution.

	little more subjective in the quantity of detail for each step described. A student should be able to describe a practical solution within the constraints that I have set. Sometimes students go so far as to point out my constraints are not practical and are able to find a new pattern. There are rarely right or wrong answers in their conclusions. What I evaluate them on is their grasp of a process and their ability to adapt that process to specific needs and their ability to explain why they are making choices. What I try to impress on my students at the beginning of this course is not to worry about the conclusion. I am not concerned so much with the final results. At this level original conclusions are rare. What is important is not only that they learn how to do research, but they feel comfortable and enjoy it. Once the process becomes second nature, worthwhile conclusions will take care of themselves.	

The Inventory provides the first "snapshot" of Inquiry/Research-based Education for Undergraduates at Texas A&M, provides a launch point for discussion and continued refinement, and creates a baseline from which to direct future efforts implementing inquiry/research-based education at Texas A&M.

Methods for Gathering and Analyzing Data

The Part I quantitative analysis and descriptive statistics are provided by MARS, and Part II qualitative data is further disaggregated for the Colleges by the Office of Institutional Assessment (OIA). Central to Part II of the Inventory are the narratives and descriptions submitted by faculty in response to five generalized competencies pertaining to Inquiry Guided Learning (V. Lee, 2004)[7].

- Formulate good questions(s) and/or identify problems(s) within the discipline
- Examine, identify and organize information regarding the question(s) and/or problem(s)
- Analyze, interpret, and present results
- Formulate conclusion(s) and/or select the best solution with appropriate justification
- Evaluate the worth and importance of the conclusion(s) – including their placement in a social, environmental and historical context[7, 10]

The style and form of data analysis conducted by the OIA adhere to the structural analysis framework for identifying patterns and text (Gall, Borg, & Gall, 1996)[8], and a text retriever, Textanz by Cro-Code[9], was used as an initial pattern identification tool.

Each respondent's answer in Part II is compared to the five Inquiry Guided Learning (IGL) competencies described by Virginia Lee[7]. The Inventory uses the expression "Inquiry-Rich Courses" to frame the competencies and prompt faculty to describe how they engage students in acquiring a specific competency followed by a query that asks for the indicators of success. The responses were examined for the following characteristics:

- The strategy, skill or activity is expressed in actionable terms preferably highlighted with the student(s) as the actor(s) followed by an action verb, and/or
- The strategy, skill, or activity described is focused on identifiable learning outcomes, and/or
- The strategy, skill, or activity conveys a defined purpose and is context specific and/or
- The relationship between the strategy, skill, or activity to learning outcome(s) is identifiable and/or
- The strategy, skill, or activity produces a context specific learning outcome.

Data from responses were copied exactly as they appear in the response query. Words and expressions that convey notable elements of an inquiry-rich teaching/learning strategy, skill, or activity, are underlined; an underlined word or expression serves as a location tool only and does not necessarily attach to an "Inquiry-rich Competency." All "No Data" cells represent blank cells. Also, the data for this report was analyzed from two separate updates; Part I tables are extracted from the April Update which includes additional entries for the Colleges of Architecture and Education, and Part II from the March Update includes entries from the Colleges of Agriculture, Architecture, Business, Engineering, Geosciences, Liberal Arts, Science, Veterinary Medicine, and Student Affairs. The data tables will be reviewed and updated when the cut off date for the current inventory is determined and the final compilation completed.

It is natural for a participant to respond to the five "Inquiry-rich" Competencies as a unified whole, such that the response to one Competency query may also apply to one or more of the others. Also, it is not uncommon for details in an "Indicators of Success" response to apply to an "Engagement Response," and vice versa. The responses are therefore viewed holistically such that the entire range of responses constitutes eligible entrees for any given "Inquiry-rich Competency." The presentation is based solely on the participants' responses on the Inventory with all cells in alignment with specific query responses to "student engagement" and "indicators of success."

The main goal of the college summaries is to provide some indication of the range of strategies, skills, and activities present - the information should not be used for comparison purposes. The omission of a check in the "Inquiry-rich Competencies" table does not imply that an associative strategy, skill, or activity is absent, but that there is insufficient data for

evaluation. The presentation should be viewed as a beginning or launch point for discussion. Each checkbox remains "active" and can be changed to accommodate an interpretive perspective deemed more appropriate by a College. The Inventory Queries for both Part I and II of the Inventory, were corroboratively derived through considerable discussion over a year or more of QEP Council deliberations and study. The pathways of creation for the Inventory Queries may be traced back and through the 2006 QEP Council Minutes[11] and *Teaching and Learning through Inquiry: A Guidebook for Institutions and Instructors*, by Virginia Lee[7].

References

1http://www.tamu.edu/provost/documents/reports/oneprinciple.pdf

[2] http://www.tamu.edu/vision2020/culture/culture.pdf

[3] http://qep.tamu.edu/plan/qep_2002.pdf

[4] http://www.tamu.edu/provost/documents/reports/inpursuit.pdf

[5] http://www.tamu.edu/president/taskforce.html

[6] http://www.tamu.edu/president/documents/utfr/muranofinalreport.pdf

[7] Lee, Virginia, Ed. ((2004), *Teaching and Learning through Inquiry: A Guidebook for Institutions and Instructors*, Sterling, VA: Stylus Publishing.

[8]Gall, Meredith D., Borg, Walter R., Gall, Joyce P. (1996), *Educational Research: An Introduction* 6th Ed., White Plains, NY: Longman Publishers.

[9] http://www.cro-code.com/textanz.jsp

[10] http://qep.tamu.edu/refined_qep/inquiry_rich.htm

[11] http://qep.tamu.edu/members/index.html

Figure 1

The spreadsheet was organized to indicate the separate response fields for each of the five Inquiry-rich descriptors, such that there are two pairs of responses for each – one for “engagement” and the other for “indicators of success.”

	A	B	C	D	E
3	**Rec#**	**College**	**Inquiry-rich Competencies**	**Teaching Engagement Strategy**	**Indicators of Student Success**
4					
5					
6					
7					
8	Rec#	Course #	☐Formulate good questions and/or identify problems(s) within the discipline ☐Examine, identify, and gather information regarding the questions(s) and/or problems. ☐Analyze, interpret, and present results ☐Formulate conclusions(s) and/or select the best solution with appropriate justification ☐Evaluate the worth and importance of those conclusion(s) – including their placement in a social, environmental and historical context, as appropriate.	Response cell to "Formulate good questions…" for "Ways my course engages students in this"	Response cell to "Formulate good questions…" for "Indicators of student success"
9				Response cell to "Examine, identify, and gather information…" for "Ways my course engages in this"	Response cell to "Examine, identify, and gather information…" for "Indicators of student success"
10				Response cell to "Analyze, interpret, and present results" for "Ways my course engages students in this"	Response cell to "Analyze, interpret, and present results" for "Indicators of student success"
11				Response cell to "Formulate conclusion(s) and/or select the best solution…" for "Ways my course engages students in this"	Response cell to "Formulate conclusion(s) and or select the best solution" for "Indicators of student success"
12				Respnse cell to "Evaluate the worth and importance…" for "Ways my course engages students in this"	Response cell to "Evaluate the worth and importance…" for "Indicators of student success"